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Bruce Alberts: A Different Kind of Academy Chief

Esteemed in the biomedical-research community as a superstar of biochemistry and molecular biology, Bruce M. Alberts, President of the National Academy of Sciences since July 1993, is a much-discussed puzzle in Washington science-policy circles. Unlike his gravely serious, button-downed predecessors in the Academy presidency, Alberts, who came from a professorship at UC San Francisco, is admittedly gripped by one subject, science education, rather than the grand issues of science policy, politics, and funding dear to the capital's resident science crowd. He has publicly described himself as a "nut" on the subject of science education. Humorously self-effacing, Alberts, 56, often goes tieless in the hushed halls of the venerable Academy. And, unlike a proper statesman of science, when summoned to orate, he shuns written speeches, preferring to chat casually, even before large audiences. Alberts spoke with SGR Editor Greenberg on October 6. Following is the text of that conversation, transcribed and edited by SGR.

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SGR. *What looks worrisome or interesting in the science enterprise?*

Alberts. I just came back from a symposium sponsored by the graduate students at Stanford [October 3, "The Changing Role of the Biomedical Scientist: New Careers, New Educational Needs?"] that drew something like 800 students and postdoctoral fellows from all around the Bay area. This was in the biological sciences, which we've felt were in pretty good shape in regard to job opportunities for scientists. It's clear now that the concern that the physicists have and the problems they've had with finding jobs that they feel productive in has now reached the biological community as well. There's a general sense that the biotechnology industry is slowing down its hiring. A lot of uncertainty there. There's clearly not a major expansion of universities going on. And there's a real sense among the young people that in some sense they've been misled, that we've been educating them for a world that doesn't exist anymore, where a major fraction of them expected to get independent research positions.

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SGR. *There's a lot of disappointment out there about the job situation.*

Alberts. The major issue to me is that these are very talented people I know very well—I've been interacting with them for 30 years. They have a lot of skills that they can offer to the country, and I think part of my job and others in Washington is to think about how we can find productive avenues for them to pursue with their talents. One of the things that comes immediately to my mind, given the fact that the Academy is preparing national science standards [for voluntary adoption by state and local school systems], is that those standards are going to call for science being a core subject for all Americans, starting in kindergarten through 12th grade. And the fact is that we don't have the teaching resources, the person power in the system now to make that possible. Given all that, can we design a career path for these people which will get them—for those who are interested—into effective leadership and other positions in science education?

SGR. *This would require a recasting of their career*

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In Brief

Soon returning for another public run, the so-called Baltimore case, one of the longest-running and bitterest investigations ever of scientific misconduct. Lingering on inconclusively since 1985, the case centers on allegations of data fabrication by Theresa Imanishi-Kari, now at Tufts, formerly a collaborator of Nobelist David Baltimore, who, though not accused of wrongdoing, mounted a public defense of Imanishi-Kari, clashed with Congressmen John Dingell, and thus got his name attached to the mess. Taint from the case eventually forced Baltimore to resign the presidency of Rockefeller University.

A draft of findings was sent to Imanishi-Kari in August by the Office of Research Integrity, which normally allows only 30 days for a response. At her request, she was granted three months to respond. Time was up last week, and ORI now expects to issue a final report "in a matter of weeks." If misconduct is alleged, Imanishi-Kari has the right to a courtroom-style public appeal—sure to be a grand melee.

Peter Duesberg, the UC Berkeley molecular biologist who contends that recreational drugs rather than HIV are the dominant cause of AIDS, has generally been ruled *persona non grata* by the science establishment. But Duesberg persists, and his hypothesis has been embraced by an indefatigable polemicist of various causes, Serge Lang, Yale University Professor of Mathematics, renowned for blanketing the press and others with specially collected "files" on issues. Now, *Science* magazine has assigned a west coast correspondent, Jon Cohen, to interview Duesberg for an article on alternative AIDS theories. *Science* Editor Daniel Koshland has written to NIH in support of Duesberg's rejected proposal to test the role of nitrate inhalants as a cofactor in AIDS.

. . . Scientists Confronted by Barriers to Teaching

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plans.

Alberts. That's right. Many of them will be investigators. But I know from my personal experience that others would very much like to play a role in science education. It's a major issue, and if they had a chance to do it in a setting that was productive, they would like to do it. We have barriers of two kinds. First of all, there are the formal barriers of accreditation, that is, the hoops you have to jump through in order to become a person in the public education system. We all recognize that many of those rules, at least as they apply to science teachers, are not meaningful. Several states do have alternate ways of becoming a science teacher, but it's by no means uniform. My sense is that many of the requirements are not rational. People who are scientists who go back to get teaching credentials feel that much of the material that they're learning is not useful. And even more importantly, they don't learn a lot of things that they should learn.

They should be learning what are the most outstanding curricula that exist, what are the resources you have nationally to call on to help you with whatever you are doing locally. All these sort of empowering things that would make teaching more enjoyable and more of a profession, those things are not taught to people who are being prepared and credentialed to be science teachers.

The other obstacle we have is that school systems are run like, I'd have to say the old General Motors. They're top-down management that does not take advantage of the wisdom of the best teachers and principals in the system. That makes them not a very enjoyable place to work for somebody like my students, who are used to being able to exercise their creativity and their initiative in productive ways. The need for change in school systems obviously goes beyond science. School-system management has to be dealt with the same way we've dealt with management of corporations. We need some of the energy and imagination that's going into corporate restructuring to work on our school systems. I think it's a vital national issue and I've been trying to get people in Washington and elsewhere aware of the situation.

The sad fact is that much of the education world is hidden from the view of most people who have any kind of authority over it. And one of my major roles in Washington, in general, is to bring reality, that is the views of outstanding teachers and principals in the system, to bear on Washington, that is, to bring these people, via their role in the National Research Council [research arm of the Academy], to bring their voices to places where they can be heard in Washington.

SGR. *Some people say we should turn down the PhD machine, that we're producing too many.*

Alberts. I think that if we're going to train with a very narrow PhD that's really designed for people to be independent researchers, then we shouldn't be training so many. My purpose would be to have a different kind of graduate program, which is much more flexible. We have a committee, COSEPUP [Committee on Science, Engineering, and Public Policy], which is working on a report on graduate education and the PhD degree. I don't know how that's going to turn out exactly, but the same themes will be in there.

I'll just give you my personal opinion. I'd like to see entering science students, starting with undergraduates, but also in graduate school, learn science because it's exciting and a useful way of teaching people how to think analytically. But then have a variety of quite smooth transitions they can make. This is quite different than what we have today. So that, for example, somebody coming into my school, University of California, San Francisco, can enter with the idea that they really enjoy science and they might want to have a research career. They can spend a year taking courses and doing research and maybe another half a year trying to develop a proposal.

And then have a branch point that everybody respects, where the diversity of interests and the diversity of careers are respected on campus and by the faculty. That's very important. If the faculties feel that only being like the faculty is prestigious, that message gets across quickly to the students. I'd like to see an environment where already in their first year, they were exposed to more than just research—they were exposed to science journalists, to science teachers, people from the biotech industry, so they really had a feeling for all the different kinds of careers that are possible. And by seeing outstanding people in all those careers, they can see that there are other lifestyles that are rewarding.

The second part of that is we then should have a way of allowing them to remain in the scientific milieu, in the scientific community—maintain an association with UCSF while getting credentialed to be a K-12 teacher, or science journalist, or any one of a number of other kinds of career choices they might want to make. The central point is that right now, there's a real discontinuity they have to go through that makes it enormously difficult to change course. If they want, for example, to become an educator, they have to rip themselves away from the scientific community and completely lose all connection with us, and go out to some

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. . . Concerned, Too, About the Support of Research

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education school with a very poor environment. It's really too much to ask people. We don't get many people doing that. So, my answer is that science is really a terrific training for a lot of kinds of endeavors.

At the Stanford symposium, people from the biotech industry were talking about how scientifically trained people have been enormously successful in business, because of their attitudes about problem-solving and integration and strategy. They fill all kinds of positions in biotech companies. I think we can do a lot better by our students than we are doing now.

SGR. *Science education has not been a major priority of your predecessors in this job. Other matters have occupied the attention of Academy Presidents—general science policy, relations with Congress, care and feeding of basic research. You've clearly brought a different attitude toward this job.*

Alberts. First of all, I'm very concerned about the care and feeding of research, including basic research, the maintenance of its quality and its excellence and the understanding of it on the part of both government and the public. I think the document that came out, *Science in the National Interest*, from the President [in August] is a very powerful statement, and I played some role in critiquing it. And we had that big [White House-sponsored] symposium here [in January] that began the whole process [of developing a national science policy]. And I'm very much concerned with the whole scientific enterprise and its strength. I think the science-education piece is only one part of the whole picture. But I think it contributes to the understanding of science immensely if the children of people in America are coming home excited about what they're doing in science in school. Right now, in most places, science is an onerous task of word memorization. We've gotten seriously off track, and most people like myself haven't noticed. So, part of my job is to call attention to that real deficit in the system.

SGR. *That we're neglecting science education.*

Alberts. Yes, we're neglecting the responsibility of scientists for that. I think we have a responsibility wherever we are locally to pay attention and become informed.

SGR. *And other issues, apart from education?*

Alberts. There are many other issues at the Academy that I'm very much interested in and became aware of only since coming to Washington. One of the major ones is the role of science and technology in international affairs, particularly the linkages and the strength scientists internationally can bring to improving rationality in the world. We had that population conference in India—over 60 world academies [of science, "Science Summit on World Population," October 1993]—and that was a tremendously educational experience for me. It was the first ever occasion of that kind. We agreed to continue that.

The National Research Council also has begun several joint activities with other academies, including Mexico, to enable them to do the kind of things for their government that we do for our government—to become an advisory organization. One of the things I was surprised to find out in India when I was there with the other academies was that we are really unusual. Most governments do not come to their scientist to ask them for uncontrollable advice.

We are trying to catalyze with Mexico. First—something that Frank Press [previous NAS President] started—a study coming out on the Mexico City water supply that's done jointly by American and Mexican scientists. More recently, we've been working on doing similar things with China and India. That began when we were in India and met with them at the Population Conference. And also with various groups in the Middle East.

SGR. *To give them an understanding of this advisory tradition?*

Alberts. Not only an understanding, but to give them experience with it, and get their governments appreciative of it by lending our prestige to the initial efforts. It's an effort to catalyze something new happening there.

SGR. *How far across the Middle East does this effort extend?*

Alberts. We had a meeting two weeks ago here, which I thought was a very promising start. We had representatives from academies or other scientific organizations from Jor-

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Ranking the PhD Programs

Three years in preparation at a cost of $1 million, a nationwide ranking of doctoral programs in the sciences, engineering, and humanities at over 250 universities is nearing completion at the National Academy of Sciences.

Bearing the imprint of the NAS National Research Council, the forthcoming scorecard can mean a great deal for institutional prestige, program support, and careers. "There is a lot of interest in it," an Academy staff member told SGR, adding that, on the basis of a similar NAS report in 1982, "There's pain, anguish, and anger if your institution doesn't look good."

According to the staffer, "The rankings will be clear by program and school," and go far beyond the university ratings published by pop periodicals such as *US News*.

In preparing the NAS study, thousands of faculty members were asked to rank programs at other institutions, and data were collected on financial support, facilities, and publications. An effort to track the career progress of graduates was described as "not too successful."

The study was financed by the Andrew Mellon, Ford, Sloan, and Hewlett foundations, plus NAS funds. Publication is expected in January or February.

. . . Promoting Research Cooperation in Middle East

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dan, the Palestinian authority, Israel, and Egypt, as well some observers here. We had a two-day meeting.

SGR. *Did Syria get involved in this?*

Alberts. Syria was not represented. They were invited, but were not there. The thrust of this was trying to work out some projects of the kind that I'm talking about, that is, similar to the study of the Mexican water supplies, but a study that's more regional. For example, micronutrients in children in the Middle East was one of the possible topics. Another one was a topic having to do with vaccination. There were several topics suggested in this two-day meeting having to do with water, which is a very important issue.

SGR. *Why would micronutrients in children be of particular interest in that region?*

Alberts. Apparently, there are dietary deficiencies that could be rather straightforwardly remedied with changes in food sources. So, what we've done is identify a set of potential issues, and we hope to catalyze something by our participation as well that would be regional, rather than just between two countries, involving four or more countries in the Middle East with us, with their scientists working together studying particular problems of interest.

SGR. *Is our State Department or Agency for International Development [AID] cooperating with this, or are you essentially on your own?*

Alberts. There were representatives from AID there. We invited a lot of people to come as observers. What they will do with this, I don't know. We are hosting a major forum here early next year [date not set] for Jack Gibbons' office—the President's Science Advisor—dealing with science and technology as it applies to foreign affairs.

SGR. *The role of science and technology in international relations?*

Alberts. Right. We've had dinners, and we'll have another one, where we invited George Brown [D-Calif., Chairman of the House Science, Space, and Technology Committee], and several other people from Washington, as well as academics, who are interested in this matter, to have a discussion of how we might catalyze a more central role for science and technology in our AID programs. There's a general feeling that science and technology has been an add-on, as an afterthought to what we're doing in our foreign affairs, and that if the new view of what we're trying to do in our international relations is to build up sustainable economies, science and technology should hold a centerpiece.

SGR. *There's no question that scientists are hurting because of the funding situation. Is* science *itself being harmed?*

Alberts. The science that I know about is really exploding and exciting. It's unfortunate that so few people understand it, and that's, of course, something that science education will help to fix. I think the scientific endeavor is fantastic, intellectually stimulating, exciting, all kinds of surprises. Biology is like we've been filling in a puzzle for a hundred years, and now we have enough of the pieces, so that every time you put in a new piece of the puzzle, rather than just being an isolated piece put in, it connects to so many other things that you see completely unexpected new relations.

The fact is that we find repeatedly in biology that the evolutionary process has created mechanisms in cells that are much more clever than anybody could ever have predicted. And there's tremendous intellectual satisfaction from having every month some new revelation that explains something that you had worried about, if you thought about it, and couldn't see how it was done by cells. The other thing to say is that we're still very far away from being done with this process. It's going to go on for hundreds of years because cells are enormously complicated.

So, as far as science is concerned, and the potentials that understanding cells could bring to human knowledge, I think we're just at the very beginning. It's a terrific time for science. For scientists it's a time when many people are quite concerned about what's going to happen to the future of the discipline, since, as you know from our academy report [*Meeting the Nation's Needs for Biomedical and Behavioral Scientists*—SGR, IN PRINT, October 1] we're discovering that over the last ten years, the number of young independent investigators has been declining. And it looks like it may be declining even faster in the next few years. So, many of us are concerned that we need to do something different about how we manage the funding to ensure that younger people have a chance to get started in a more comfortable and encouraging environment.

SGR. *From the perspective of a Congressional appropriations committee, science remains enormously productive. So, it is not unreasonable for a politician to conclude that it's doing just fine and anything beyond that would be an entitlement program, not a science program.*

Alberts. The question of how much science is enough was addressed in the COSEPUP report last year [*Science, Technology, and the Federal Government: National Goals for a New Era*].

SGR. *It was non-addressed.*

Alberts. Basically, it said that it's up to the public to decide how much resources they want to put into science. And it gave some kind of guidelines as to how they might decide what would be enough. I think it's our job as scientists to do two things. One is to explain science to the public much better than we've been doing. Science education is one such route, but there are many other routes. We need to have a better interface with the public so they understand what it's all about. There's a real danger of people being so distant from it that they don't really understand what it is.

The other thing that we have to do, and I'm very interested in this, is to make sure that the resources we have are spent as effectively as we can spend them. Harold Varmus [Direc-

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. . . Would Public Understanding Bring More Support?

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tor of NIH] is thinking carefully about the peer-review process—how we can make it more effective. I think that all the agencies need to step back and think about how they're spending their money on science. And that's something that the scientific community really is uniquely qualified to do, and we should take it very seriously. We've been asked by Congress to undertake a new study of the total R&D investment the government makes, and, specifically, look at the question of what kind of mechanisms should we use to assure that the money is being as well spent as it can be.

SGR. *There's an implicit assumption that if the public knows more about science, it will be more supportive of science. What's the evidence for that?*

Alberts. It's hard for me to imagine people continuing to support science strongly if they're afraid of it. Most of the people in this country who had science in school found it distasteful and something quite mysterious. Nevertheless, they strongly support it, which is surprising.

I can't believe—I don't have the evidence for this—that if they understood it better and found it more friendly, they wouldn't support it more strongly. I have absolutely no evidence for this. But, as I said before, if scientists can contribute to society in broad numbers of ways, people will see that the benefits they're getting from scientists are more than just cures for disease. You're getting among all children the ability to solve problems, changing one variable at a time, a sort of excitement about investigating the world in a productive, outgoing approach to the world that will make them productive citizens and productive employes—the kind of employes that industry wants, who can independently solve problems. Those are benefits that scientists can bring to the country beyond the traditional ones that we've been talking about. In *Science in the National Interest*, the last section is quite revolutionary in suggesting that there's a major role for scientists to play, that scientists have to take major responsibility for K-12 science education.

SGR. *It is just as plausible an assumption that if the public were more knowledgeable about science, it might be more resistant to this or that line of science. The hey-day of scientific support coincided with a period of general public ignorance about science, something you're trying to correct now.*

Albert. I think the support came in part because of competition with the Soviet Union. The fact was that the Soviet Union had a lot of science—supported it heavily, in their world. We supported it heavily, as well. So, as everybody said, we need a rethinking of why we're doing the kind of science we're doing. And the rationale for that was, of course, given in the COSEPUP report last year. And it also is, again, reemphasized and magnified in the *Science in the National Interest* document from the President. My own feeling is that, because I see the great virtue of everybody knowing more about science for their own personal lives, we'd have more support for science if they really enjoyed it, understood it, and it became an important part of their view of the world. I can't prove that.

SGR. *The best-supported basic science is biomedical, and this was in no way involved in east-west competition.*

Alberts. Biomedical research continues to be well supported because of the health motivation. I think people do understand when they see some new developments. I wish that they understood more about what was happening. I think that too often the newspapers misleadingly promote new discoveries as something that will immediately affect people's health. I think people need to be more sophisticated so they can interpret that. That's another reason to have them be more educated. The rationale for supporting science can be broadened by having scientists much more visible in the country, have them involved more with society, have them much more part of society. We have a program in the San Francisco public schools that's a partnership between UCSF and the school system where we send scientists into the schools to work with teachers.

The first thing we suggest to these volunteers is that they tell them what their life is like as a scientist. And when you send these people into the schools, young people, women, and minorities, etcetera, it's surprising how often the children in the school find it hard to believe that these people are scientists. Maybe from the movies, they have a completely misguided image of scientists as old, slightly crazed-looking white males. And if you have that view of science, it's hard for me to see how you can continue to support it very strongly for very long.

SGR. *Among all the professions, science is perhaps most notably absent from elective politics. We've got one or two in the whole Congress. Does your interest in a scientifically educated public extend to encouraging scientists to run for office?*

Alberts. I'd be happy to encourage them to run for office. I think it would be a tremendous sacrifice for a scientist to do that. But I think it would be terrific if we can have more scientifically educated people in Congress. One of the things maybe we can do is to bring more people who are scientifically trained to Washington as science fellows to get them more familiar with government. I'm interested, for example, in establishing a fellowship program at the National Research Council that will bring scientists here to work on science policy.

I actually am quite impressed with the people I see in Washington working in government who have a real scientific background. These are the same kind of people who have risen to the top in universities—very energetic, wise people. I think obviously, we need a continuing supply of those kind of people coming to Washington. They have very important roles here. If it eventually develops that some of those people go back home and run for office, that would be terrific.

US Science Attaches, Counselors at Posts Abroad

For American scientists with professional interests in other nations, a useful but underutilized resource are the science and technology specialists posted at many major US Embassies and Missions to report on and cultivate relations with the local research establishments. Ranked as either Attaches, Counselors, or Officers for Environment, Science, and Technology (EST), they can also assist American researchers in making contacts in their territory, identifying researchers and institutions in various fields, etc.—if they are willing, which isn't always the case.

Most certainly, they are not inclined to provide tourist services, except for visitors with high rank or important connections. Since SGR last published a roster of these foreign-based officials (May 15, 1993), many reassignments have occurred.

Following is a current list, as of October 1. Local addresses are given for each capital. However, the State Department says the preferred means of mailing is through the Army Post Office (APO) and Fleet Post Office (FPO) addresses, which are listed directly following many, but not all, local street addresses; just APO or FPO and the letters and numbers suffice, says State.

(Coming soon: foreign science and technology attaches and counselors assigned to embassies and missions in the United States.)

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Argentina. Ken D. Cohen, EST Counselor, US Embassy, 4300 Colombia, 1425, Buenos Aires.

APO AA 34034; tel. (54) (1) 777-4533 and 777-4534; fax 777-0197.

Austria. Michael J. Lawrence, Counselor for Nuclear Policy; Bruce A. Cooper, Counselor for Nuclear Technology; Marvin R. Peterson, Senior Science Attache, US Mission to International Organizations in Vienna (UNVIE), Obersteinergasse 11/1, A-1190, Vienna.

Tel. (43) (1) 36-31-52; fax 36-9-1585,

Belgium. Stephen V. Noble, EST Officer, US Mission to the European Union, 40 Blvd. du Regent, B-1000 Brussels;

APO AE 09724; tel. (32) (2) 513-3830; fax 511-2092.

Paul Rambaut, EST Counselor, US Mission to NATO, Autoroute de Zaventem, B-1110, Brussels.

APO AE 09724; tel. (32) (2) 242-5280; fax 242-0696.

Brazil. Leroy C. Simpkins, EST Counselor, US Embassy, Avenida das Nacoes, Lote 3, Unit 3500, Brasilia.

APO AA 34030; tel. (55) (61) 321-7272; fax 225-9136.

Canada. Thomas J. Wajda, EST Minister-Counselor, US Embassy, 100 Wellington St., K1P 5T1, Ottawa, Ontario.

PO Box 5000, Ogdensburg, NY 13669-0430; tel. (613) 238-5335 and 238-4470; fax 238-5720.

China. Marco S. DiCapua, EST Counselor, US Embassy, Xiu Shui Bei Jie 3, 100600, PSC 461, Box 50, Beijing.

FPO AP 96521-0002; tel. (86) (1) 532-3831; fax 532-3178.

Czech Republic. Douglas B. McNeal, EST Counselor, US Embassy, Trziste 15, 11801, Prague 1, Unit 1330.

APO AE 09213-1330; tel. (42) (2) 2451-0847; fax 532-457.

Denmark. Stephanie S. Kinney, EST Counselor, US Embassy, Dag Hammarskjolds Alle 24, 2100 Copenhagen.

APO AE 09716; tel. (45) (31) 42-31-44; fax 43-02-23.

France. Jerome J. Bosken, EST Counselor, US Embassy, 2 Ave. Gabriel, 75382 Paris.

APO AE 09777; tel.(33) (1) 42-96-12-02 and 42-61-80-75; fax 42-66-97-83.

Coleman J. Nee, EST Counselor, US Mission to the Organization for Economic Cooperation and Development, 19 Rue de Franqueville, 75016 Paris.

APO AE 09777; tel. (33) (1) 45-24-74-77; fax 45-24-74-80.

Germany. Richard R. Ries, EST Counselor, US Embassy, Diechmanns Aue 29, 53170 Bonn.

APO AE 09080; tel. (49) (228) 3391; fax 339-2663.

Hungary. Richard S. Taylor, EST Attache, US Embassy, V. Szabadsag Ter. 12, Budapest.

APO AE 09213-1320; tel.(36) (1) 112-6450; fax 132-8934.

India. Paul C. Maxwell, EST Counselor, US Embassy, Shanti Path, Chanakyapuri 110021, New Delhi.

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Indonesia. Sidney G. Smith, EST Officer, US Embassy, Medan Merdeka Selatan 5, Jakarta.

APO AP 96520; tel. (62) (21) 360-360; fax 386-2259.

Israel. David W. Mulenex, EST Officer, US Embassy, 71 Hayarkon St., Tel Aviv.

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Italy. Gregory J. Dunn, EST Counselor, US Embassy, Via Veneto 119/A, 00187 Rome.

APO AE 09624; tel (39) (6) 46741; fax 488-2672.

Japan. Michael A.G. Michaud, EST Minister Counselor, US Embassy, 10-5, Akasaka 1-chome, Minato-ku (107), Tokyo.

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Korea. Frederick Kenneth Crosher, EST Counselor, US Embassy, 82 Sejong-Ro, Chongro-ku, Seoul.

APO AP 96205-0001; tel. (82) (2) 397-4114; fax 738-8845.

Mexico. S. Ahmed Meer, EST Counselor, US Embassy, Paseo de la Reforma 305, Mexico City, DF.

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Poland. James W. Chamberlain, EST Counselor, US Embassy, Aleje Ujazdowskie 29/31, Warsaw.

APO 09213-1340; tel. (48) (2) 628-3041; fax 628-8298.

Russia. Vladimir P. Sambaiew, EST Counselor, US Embassy, Novinskiy Bul'var 19/23, Moscow.

APO AE 09721; tel. (7) (095) 252-2451 through 59.

South Africa, Michael W. Holshey, EST Officer, US Embassy, 877 Pretorius St., Arcadia 0083, Pretoria.

Tel. (27) (12) 342-1048; fax 342-2244.

Spain. Helen B. Lane, EST Counselor, US Embassy, Serrano 75, 28006, Madrid.

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Switzerland. Harlan Cohen, EST Officer, US Mission to European office of UN and other international organizations, Route de Pregny 11, 1292 Chambesy-Geneva.

Tel. (41) (22) 749-4111; fax 749-4880.

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In Print

(Continued from Page 8)

From the Congressional Office of Technology Assessment (OTA):

Assessing the Potential for Civil-Military Integration: Technologies, Processes, and Practices (GPO Stock No. 052-003-01394-1; 200 pp., $13), observes that civilian industries already supply a significant portion of goods required by the armed services. But, beyond that, says OTA, it's slow going in pursuit of the economically and politically attractive goal of a bigger common industrial base for the civilian and military economies—mandated several times by Congress, most recently in the Federal Acquisitions Streamlining Act of 1994.

OTA cautions that savings from integration may be lower than claimed, but notes that even a 2-3 percent reduction in defense costs amounts to several billion dollars. The report says the Pentagon's "acquisition workforce" numbers more than 178,000, at an annual cost of over $7 billion in salaries. Jack Nunn of the OTA staff served as Project Director for the study, part of an ongoing OTA defense-conversion series for which previous publications are listed in this report.

Identifying Health Technologies That Work: Searching for Evidence (GPO Stock No. 052-003-01389-4; 308 pp., $20), says that government-sponsored studies of the effectiveness and comparative costs of health-care technologies "will probably improve the quality of health care," but cautions that cost reductions will not necessarily ensue from such research. Stressing the difficulty of developing guidelines from analysis of "large administrative data bases," the OTA report concludes that "No clear, wholly credible finding about the direct effectiveness of one medical practice over another has been derived directly from this research method thus far." What's needed, OTA suggests, are "innovations in the design of clinical trials, and greater incorporation of RCT [randomized clinical trials] into ordinary practice ... to improve the level of knowledge about the comparative effectiveness of existing medical interventions." Elaine J. Power of the OTA staff was Project Director for the study.

Federal Research and Technology for Aviation (GPO Stock No. 052-003-01391-6; 192 pp., $13), focusing on the Federal Aviation Administration's technology and regulatory programs, OTA concludes they're far short of optimal for promoting the development of aviation services. The report says federal R&D for aviation lacks "explicit priorities and objectives." Among many alleged deficiencies: insufficient and fragmented research on meeting noise and other environmental constraints on sub-sonic aviation. Kevin Dopart served as OTA Project Director

Summaries of these reports, four to eight pages, are available without charge from: US Congress, Office of Technology Assessment, Washington, DC 20510-8025; tel. 202/224-8996.

For the complete reports: New Orders, Superintendent of Documents, PO Box 371954, Pittsburgh, Pa. 15250-7954; tel. 202/512-1800; fax 202/512-2250.

From the Critical Technologies Institute (CTI), a division of RAND:

The Decline of the US Machine-Tool Industry and Prospects for Its Sustainable Recovery (Vol. I, [MR-479/1-OSTP] main report, 152 pp., $15; Vol. II [MR-479/2-OSTP] an appendix containing case studies of machine-tool industries in Japan, Germany, and Italy, statistical data, etc.), a cautiously upbeat picture of the US machine-tool industry, described as small ($4 billion a year) but crucial for enhancing industrial productivity. The report, mandated by Congress, is the first major production from the two-year-old CTI, a Congressional creation attached to the White House Office of Science and Technology Policy. After a nosedive in the 1980s, the report says, the industry is benefiting from US emergence from recessions that still afflict Europe and Japan. CTI credits research in universities and federal labs with helping American firms. Recommendations include: more industry input into federal R&D on manufacturing, creation of centers of excellence in manufacturing sciences, and rotation of personnel between public and private sectors. David Finegold is the principal author of the report.

Order from: Rand Distribution Services, PO Box 2138, Santa Monica, Calif. 90407-2138; tel. 310/451-7002; fax 310/451-6915; Internet: order@rand.org.

From the General Accounting Office:

Food Safety: USDA's Role Under the National Residue Program Should Be Reevaluated (GAO/RCED-94-158; 71 pp., no charge), says testing under the residue program, conducted by the Food Safety and Inspection Service of the Department of Agriculture, uses flawed methodology and fails to keep pace with the introduction of new substances in food products.

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20884-6015; tel. 202/512-6000; fax 301/258-4066.

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In Print

Official reports and other publications of special interest to the research community

(Copies of publications listed here are available from the indicated sources—not from SGR)

From the Science Policy Research Division (SPRD) of the Congressional Research Service, part of the Library of Congress (all without charge):

Big Science and Technology Projects: Analysis of 30 Selected US Government Projects (94-687 SPR; 40 pp.), spending records and legislative backgrounds of the mega-projects of recent times, continuing, completed, and terminated, with costs of $100 million or more in 1980 dollars as the criterion for inclusion. Sixteen belonged to the Department of Energy, 11 to NASA, and 3 to NSF. Among those included: the Superconducting Super Collider, the ISABELLE/Colliding Beam Accelerator, the Hubble Space Telescope, the Ocean Drilling Project, and the National Aero-Space Plane. The study, headed by William Boesman of the SPRD, concludes that projects with hefty overruns were most vulnerable to cancellation—e.g., the Supercollider.

Indirect Costs for R&D At Higher Education Institutions: Annotated Chronology of Major Federal Policies (94-646 SPR; 33 pp.), the woeful record of one of the most contentious points in academic-government relations—overhead rates on federally financed research in universities. The account starts with World War II, when Washington applied a 50-percent indirect-cost rate to salaries and wages for academic research, and continues to the Clinton Administration's plan—thwarted by Congress—to freeze payments at last year's level. In between are summaries of 50 years of policies and positions of the White House budget office, Congress, and the research-supporting agencies. Genevieve J. Knezo, SPRD, prepared the report.

AIDS and Other Diseases: Selected Federal Spending and Morbidity and Mortality Statistics (94-414 SPR; 2 pp.), inspired by popular and political contentions that AIDS receives a disproportionately large share of the federal biomedical budget, this one presents figures on spending, incidence, and mortality for AIDS, cancer, heart disease, diabetes, and Alzheimer's disease. In spending, AIDS tops the list this fiscal year, as before, with $2.7 billion from the Public Health Service, including $1.3 billion from NIH. In incidence and mortality, it ranks at the bottom of those on the aforementioned list, plus several other major afflictions. Judith A. Johnson, SPRD, prepared the report.

A roundabout route is required to obtain these reports, since the budget-strapped SPRD cannot provide them directly to the public. However, members of Congress can get them easily and usually are willing to oblige a request from a constituent. Call your Representative (202/225-3121) or Senator (202/224-3121), and tell the cheery phone answerer that you wish to obtain a copy of a report from the Science Policy Research Division of the Congressional Research Service, citing title and number.

From the Science Reference and Information Service of the British Library, London:

Science and Technology Policy: A Review of Recent Developments (6 times per year; $175 in the US), news, summaries of press articles, and about 150 brief reviews of science-policy reports, documents, etc., from the UK and other countries. In attractive magazine format, the publication is indexed and far-reaching in its coverage. The August issue (46 pp.) also includes discussions of the implications of NAFTA for scientific research and technology in Canada and a report on a technology-transfer conference in July in London.

Order from: Turpin Distribution Services, Blackhorse Road, Letchworth, Herts SG6 IHN, England; tel. 0462 672555.

From the Organization for Economic Cooperation and Development (OECD), Paris-based consortium of industrialized countries:

Reviews of National Science and Technology: Mexico (224 pp., $24), 15th in OECD's series of S&T country reviews. An OECD announcement of the publication says S&T in Mexico is making a comeback after a severe decline in the 1980s, and states that the review "assesses, mostly in a positive light, the measures and mechanisms recently introduced in the science and technology system."

Order from: OECD Publications and Information Center, 2001 L St. NW, Suite 700, Washington, DC 20036-4910; tel. 202/785-6323; fax 202/785-0350; also available from subscription agencies and OECD offices and bookshops in many cities around the world.

From the North Carolina Biotechnology Center:

Technology Transfer: Working for Collaboration, Commerce, and Competitiveness (68 pp., no charge), emphatic conclusions about the economic importance and means of encouraging technology transfer from academe to industry, based on a study conducted for the Biotechnology Center by a 37-member Advisory Committee on Development and Transfer of Biotechnology. Among the findings: North Carolina's economic future will be increasingly dependent upon links between university research and industry, particularly start-up companies; universities should recognize tech transfer as "part of their public service mission," and "Moving university-based technology to commercial settings—particularly to small companies—requires that both the universities and the companies have access to increased resources and financial support." The report states, "While controversial to some, equity in start-up companies can actually be less financially risky [for universities] than conventional licensing." Jasper Memory, Vice President for Research, the University of North Carolina General Administration, chaired the Advisory Committee, which included separate subcommittees on public and private universities and on legal issues.

Order from: North Carolina Biotechnology Center, attn. W. Steven Burke, VP Corporate Affairs and External Relations, Box 13547, Research Triangle Park, NC 27709-3547; tel. 919/541-9366; fax 919/990-9544. *(Continued on Page 7)*